

WHAT IS CLAIMED IS:

1. A robot apparatus having movable parts, the apparatus comprising:
a moving means for moving the robot apparatus; and
more than one load sensor that detects, as an external force, a reaction applied when the moving means contacts a ground surface; and wherein
the load sensor that includes
a pressure detecting means having a pressure-sensitive portion that converts a pressure into an electrical signal,
a pressing member which is deformed correspondingly to the magnitude of the external force and presses the pressure detecting means, and
a stopper function to limit the external force so that the pressure to the pressure-sensitive portion of the pressure detecting means is smaller than a predetermined threshold.
2. The apparatus as set forth in claim 1, wherein:
the moving means is a leg of the robot apparatus; and
the leg having provided therein more than one load sensor/sensors and each of which detects, as an external force, a reaction applied when the moving means contact a ground surface.
3. The apparatus as set forth in claim 1, wherein the pressing member including:
an activating member that is applied with the external force;
a driving member that presses the pressure-sensitive portion; and

an elastic member that couples the driving and activating members to each other and displaces linearly in response to the external force.

4. The apparatus as set forth in claim 3, wherein:

the pressure detecting means includes the pressure-sensitive portion and a peripheral portion; and

when the pressing member is applied with an external force, the activating member conveys the external force to the driving member via the elastic member, and when a further external force is applied, the activating member abuts the peripheral portion of the pressure detecting means to limit the external force.

5. The apparatus as set forth in claim 4, wherein the peripheral portion of the pressure detecting means is formed thicker than the pressure-sensitive portion.

6. The apparatus as set forth in claim 4, wherein there is provided between the activating member and peripheral portion a gap smaller than a critical linear displacement the elastic member attains in response to the external force.

7. The apparatus as set forth in claim 3, wherein:

the pressing member has a double structure in which the driving member is disposed inside the activating member formed as a bottomed cylinder;

the activating member has a step portion that presses the driving member;

the driving member has a flange that abuts the pressure-sensitive portion; and

the elastic member is formed from a belleville spring, engaged on each of the step portion and flange and couples the activating and driving members to each other.

8. The apparatus as set forth in claim 1, wherein each of the load sensors includes a case assembly that supports the pressure detecting means and pressing member.

9. The apparatus as set forth in claim 8, wherein:

the pressing member includes an activating member that is applied with the external force, a driving member that presses the pressure-sensitive portion and an elastic member that couples the driving and activating members to each other and displaces linearly in response to the external force; and

when the pressing member is applied with an external force, the activating member conveys the external force to the driving member via the elastic member, and when a further external force is applied, the activating member abuts the peripheral portion of the pressure detecting means to limit the external force.

10. The apparatus as set forth in claim 2, further comprising:

an instep member provided in the end portion of the leg;

a sole member installed to the instep member to be freely movable; and

the more than one load sensor/sensors in number and provided in either the instep or sole member.

11. A load sensor including a plate-shaped pressure detecting means having a thin pressure-sensitive portion formed in the center thereof and strain gauges installed on the pressure-sensitive portion and a driving member mounted on the pressure-sensitive portion and which is pressed by a load-applying activating member, the load sensor comprising:

an elastic member to couple the driving member and activating member to each other and which displaces linearly in response to a load applied,

the activating member pressing the driving member to the pressure-sensitive portion via the elastic member and being made to abut the pressure detecting means when a predetermined load is applied.

12. The load sensor as set forth in claim 11, wherein a thicker portion is formed around the pressure-sensitive portion and the activating members abuts the thick portion.

13. The load sensor as set forth in claim 11, wherein there is provided between the activating member and peripheral portion a gap smaller than a critical linear displacement the elastic member attains in response to the external force.

14. The load sensor as set forth in claim 11, wherein:

the driving member has a flange that abuts the pressure-sensitive portion; and

the activating member has a step portion that presses the driving member,

the elastic member being formed from a belleville spring, engaged on each of the step portion and flange and that couples the activating and driving members to each other.